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(54) Abstract Title
Distributing information within a wireless network

(57) The present invention provides a technique for distributing within a wireless network information concerning items of interest positioned within a coverage area of the wireless network. The system of the present invention includes a base station 2 for communicating with a portable device 6 over the wireless network via a first wireless communication, and a beacon 4 positioned within the vicinity of each item of interest and arranged to transmit via a second wireless communication over a predetermined range a code identifying information associated with that item. Further, a portable device 6 is provided which has a first interface for communicating with the base station and a second interface for communicating with the beacon 4. When the portable device 6 is within the predetermined range of a beacon 4 associated with one of the items of interest, it is arranged to receive the code transmitted by that beacon, and to issue to the base station 2 a request for information based on the received code. Upon receipt of the request, the base station 2 is arranged to cause the information identified by the code to be retrieved, and to transmit that information to the portable device 6, whereby it can be output to a user of the portable device. By this approach, it is possible for information to be disseminated to a portable device via the wireless network having regard to the location of the portable device within the coverage area of the wireless network.

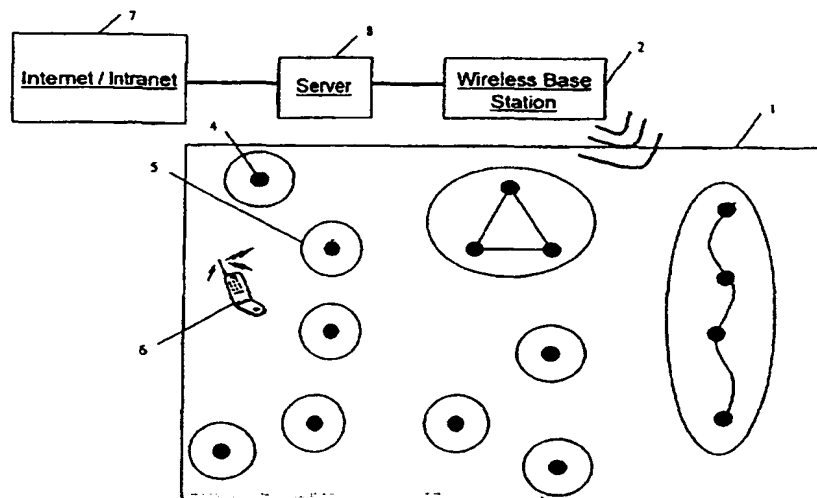


Fig. 1

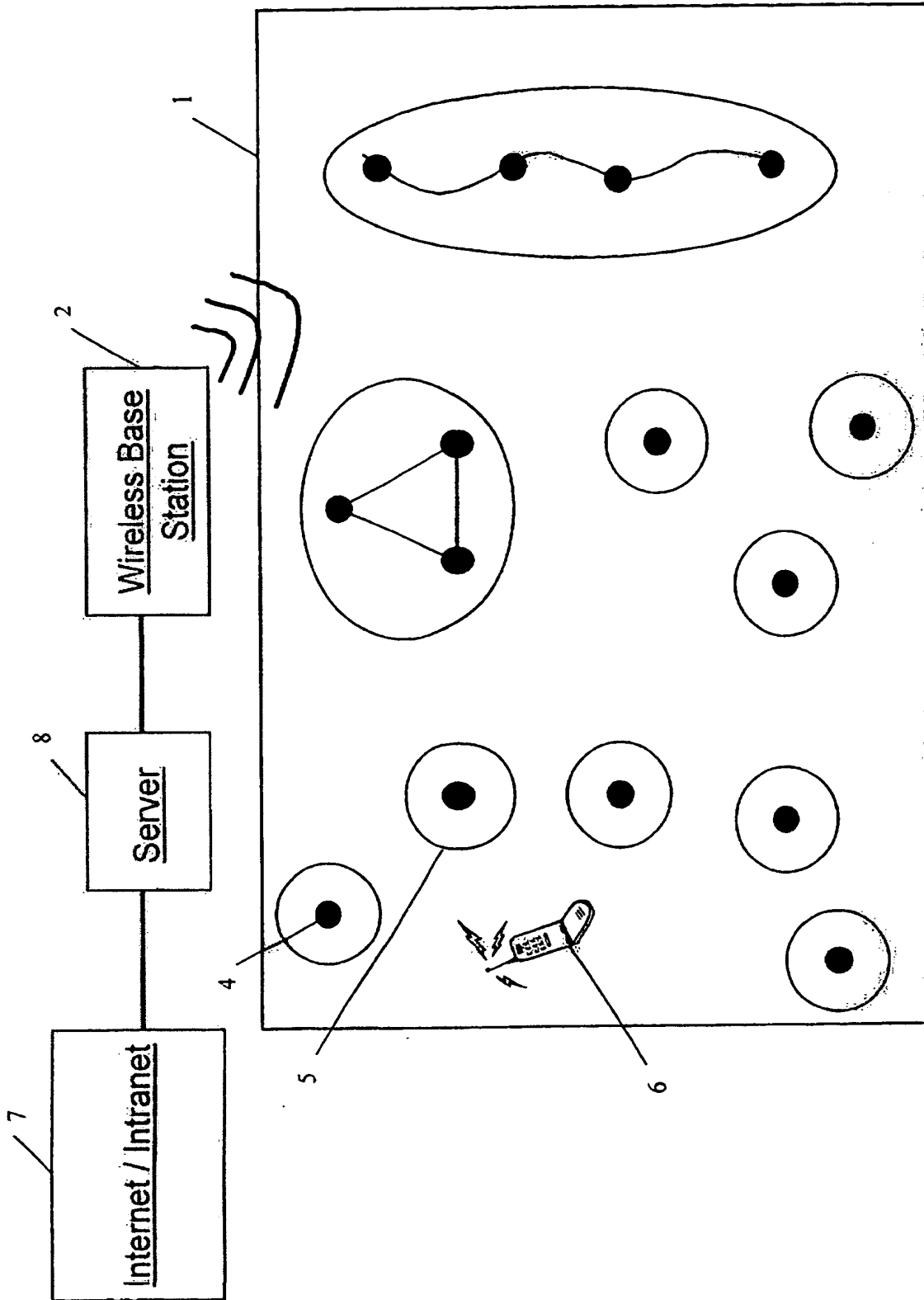
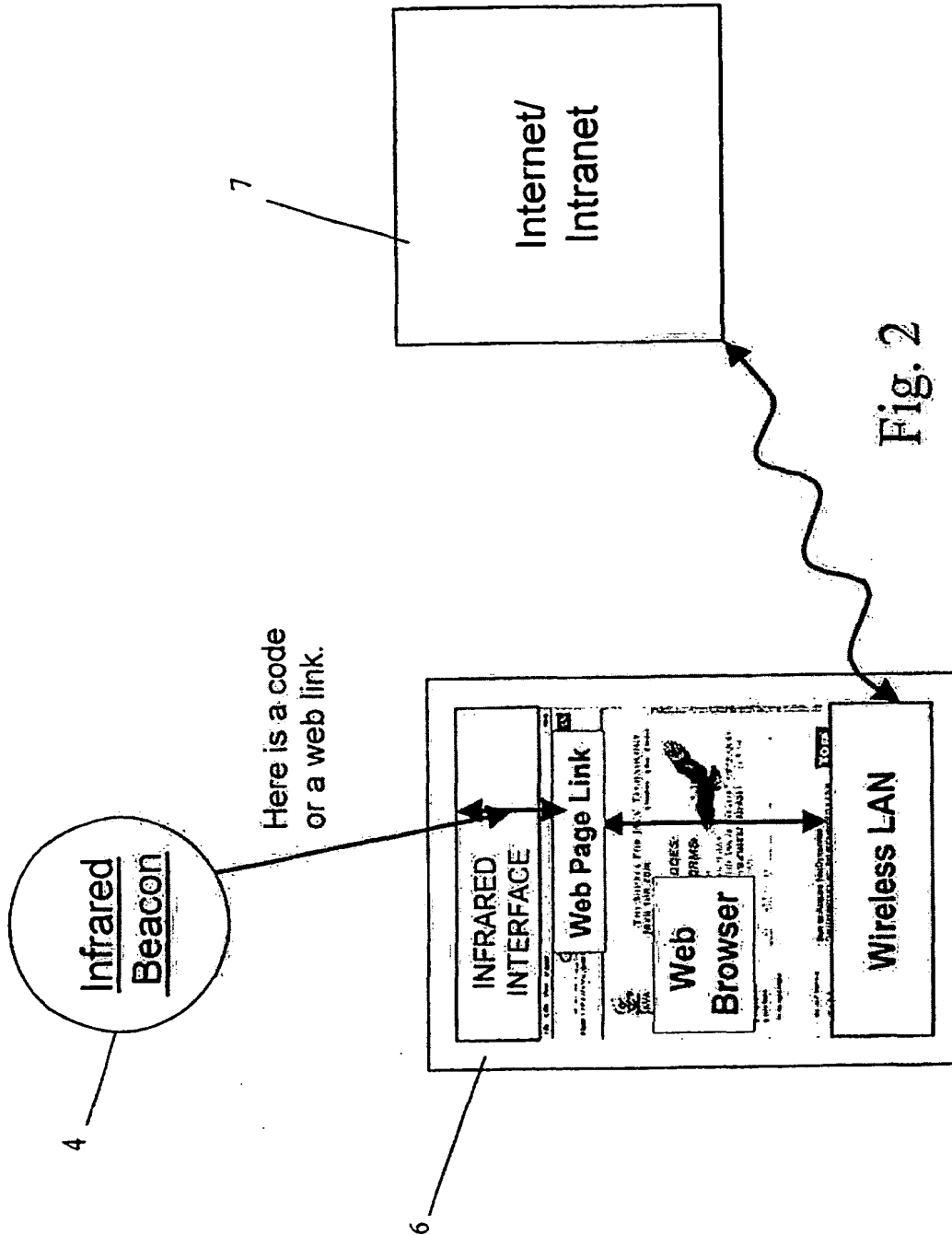


Fig. 1



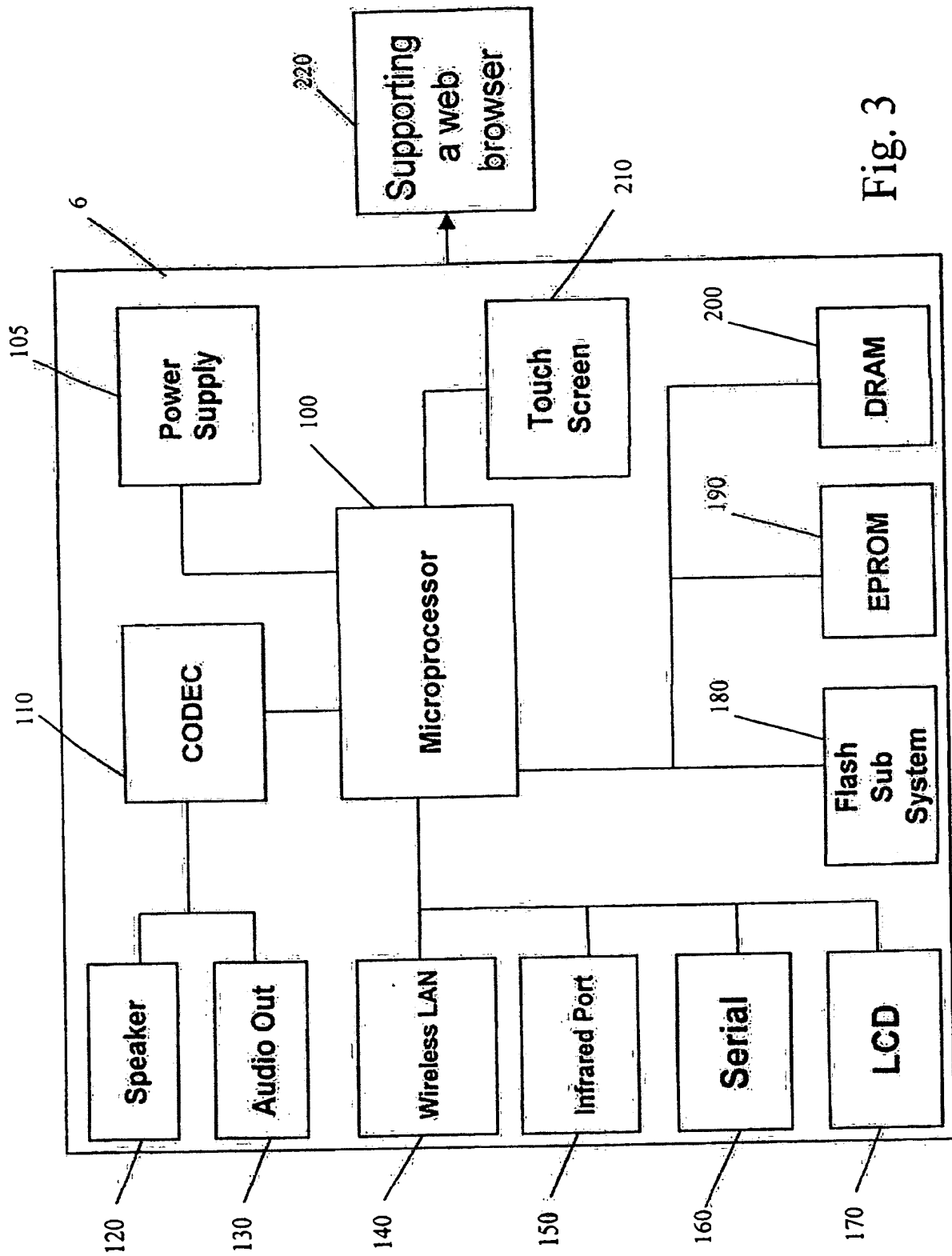


Fig. 3

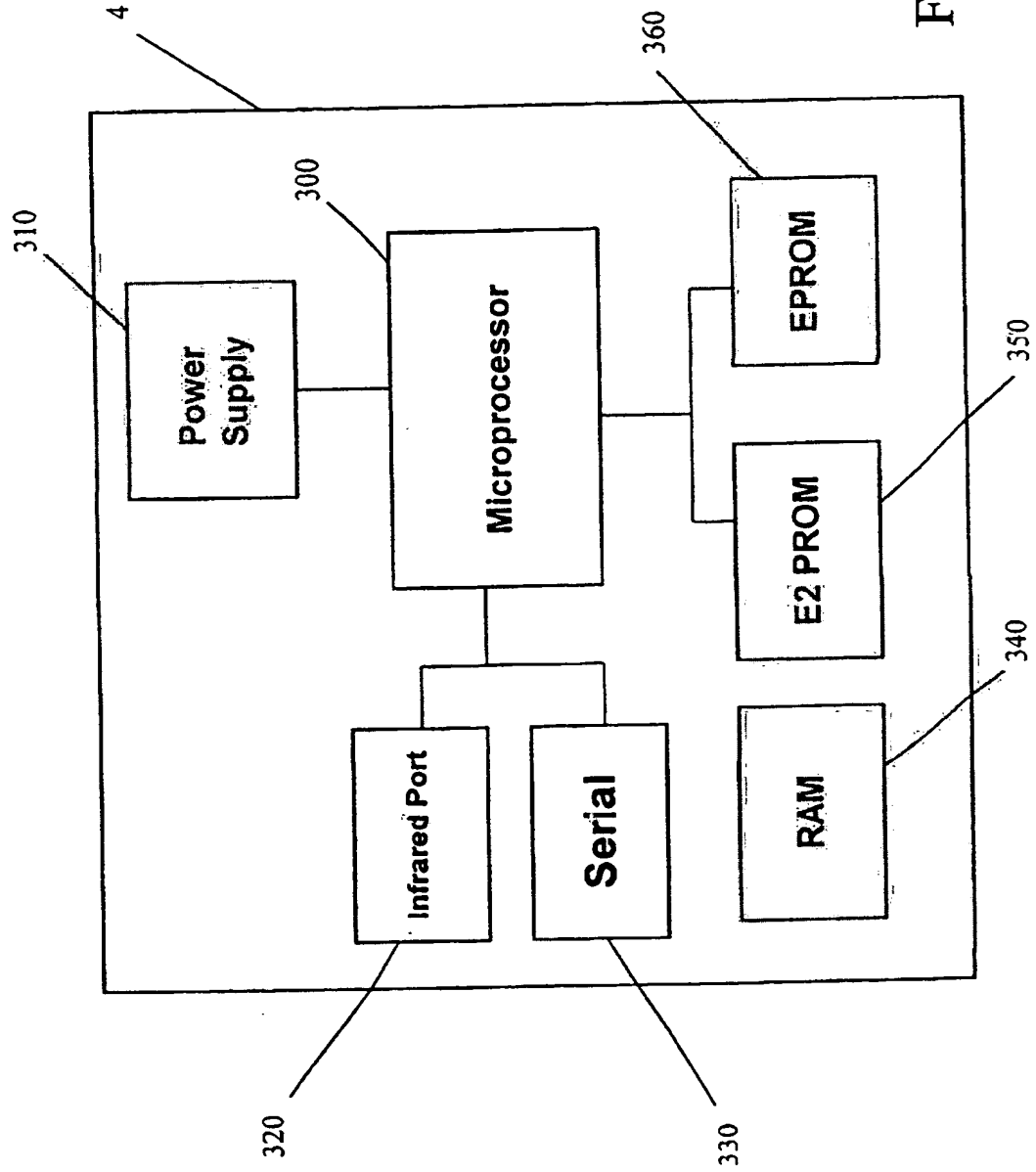
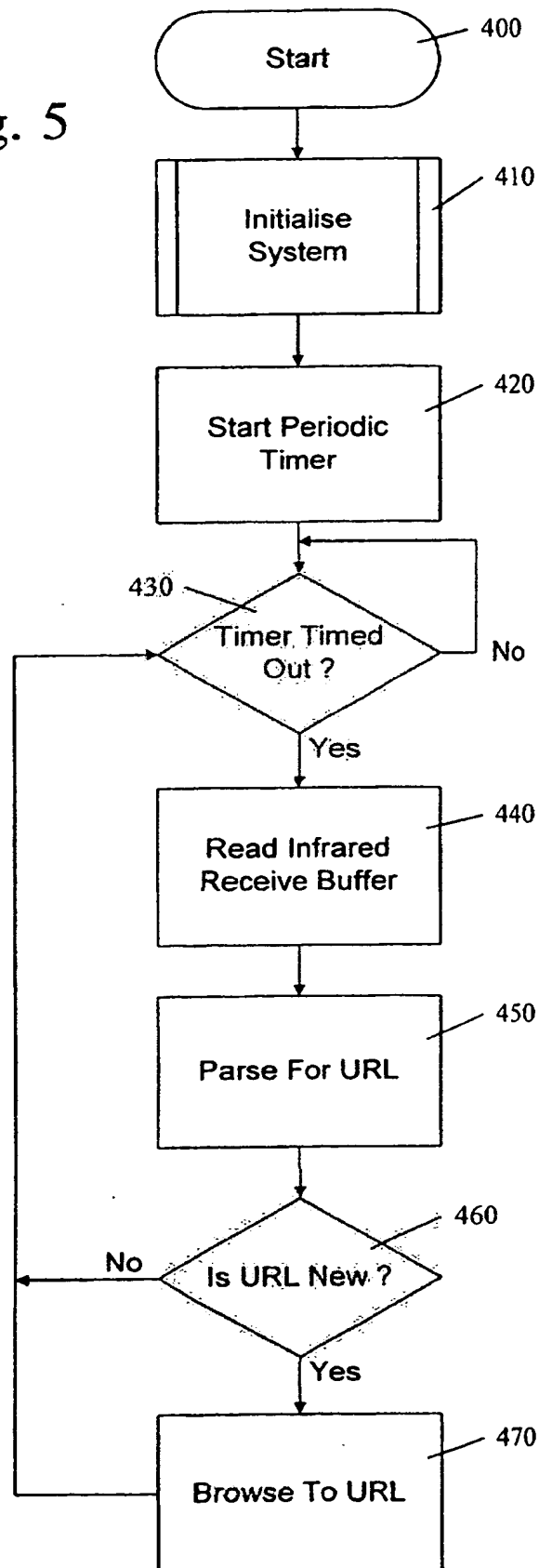


Fig. 4

Fig. 5



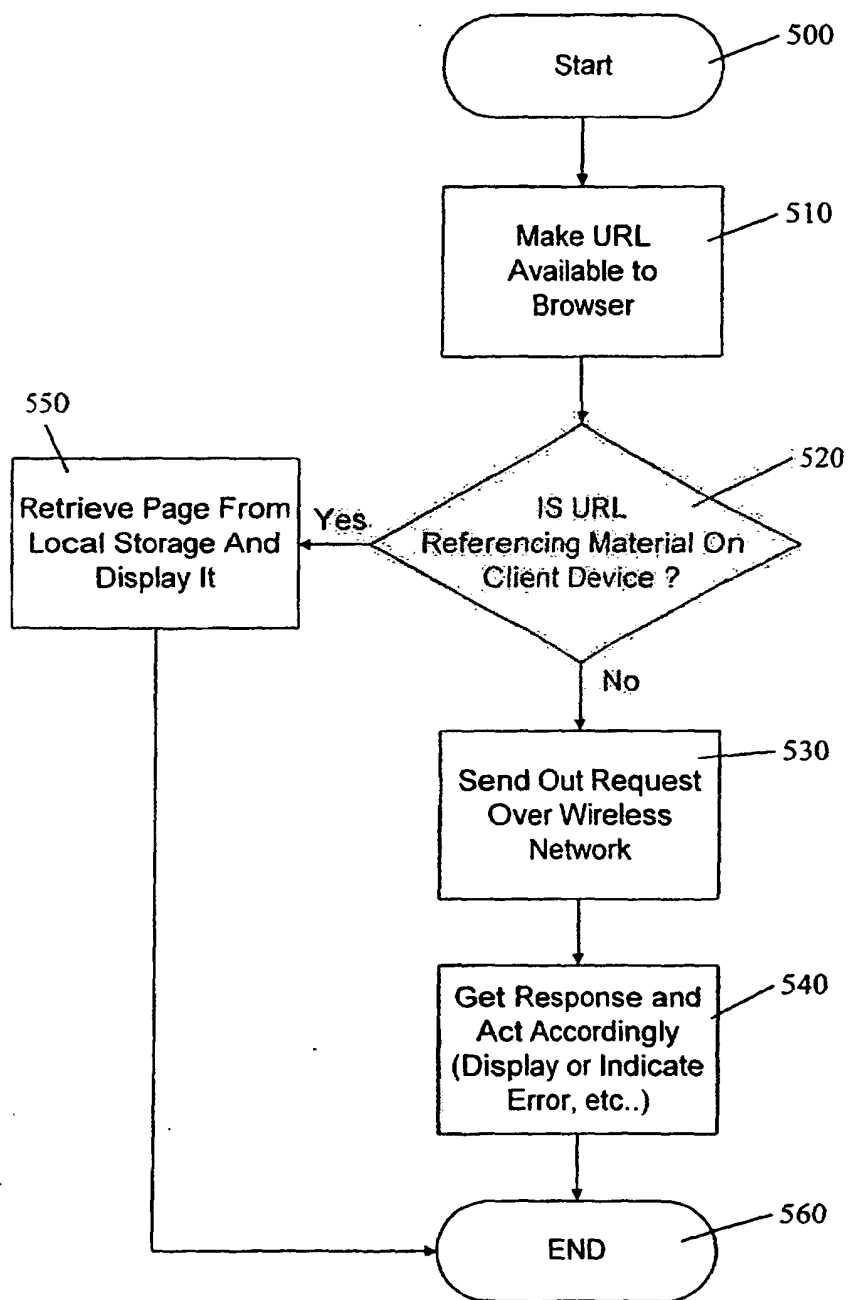


Fig. 6

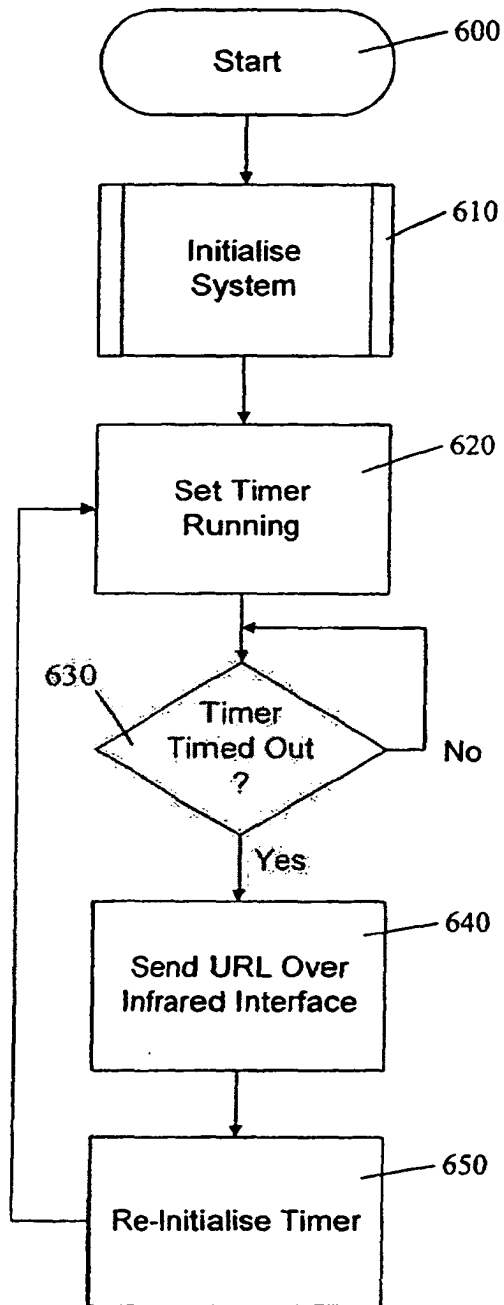


Fig. 7

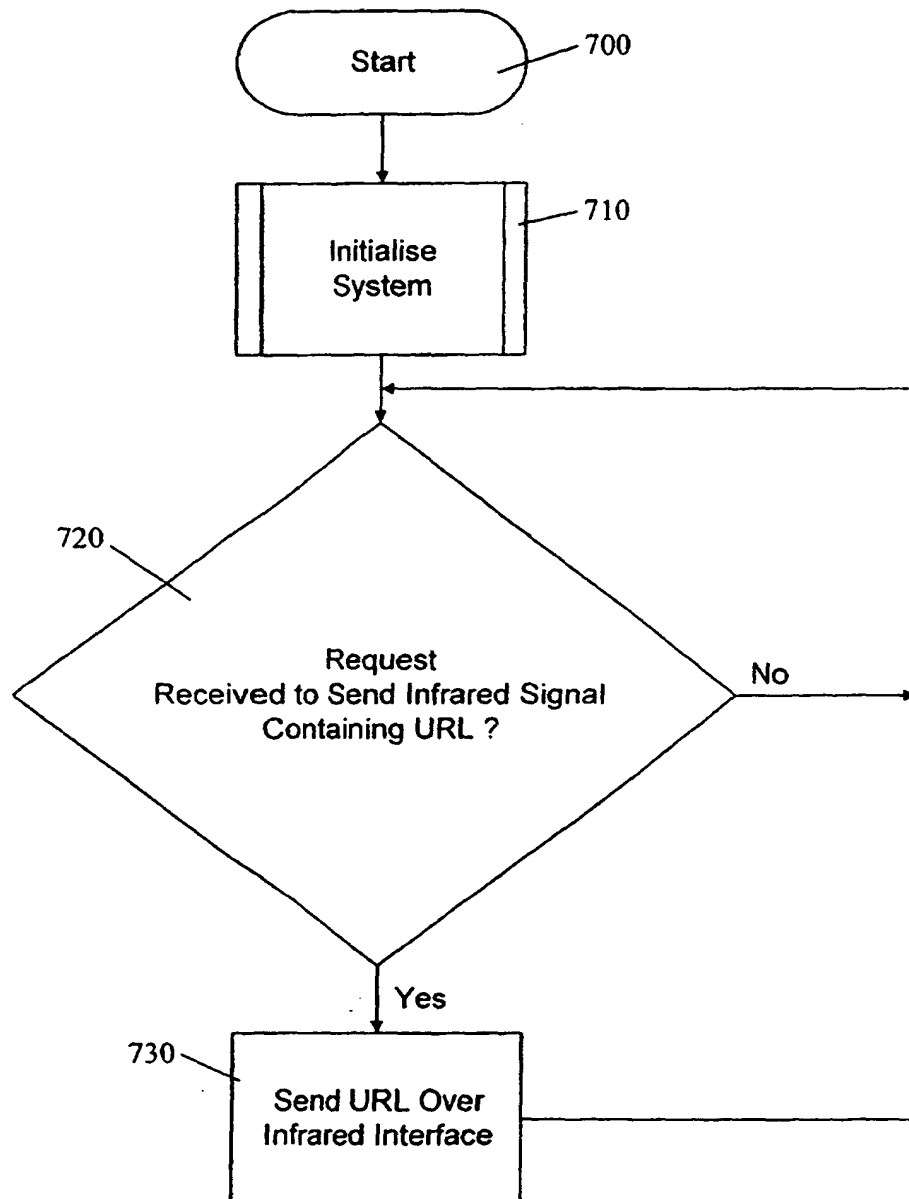


Fig. 8

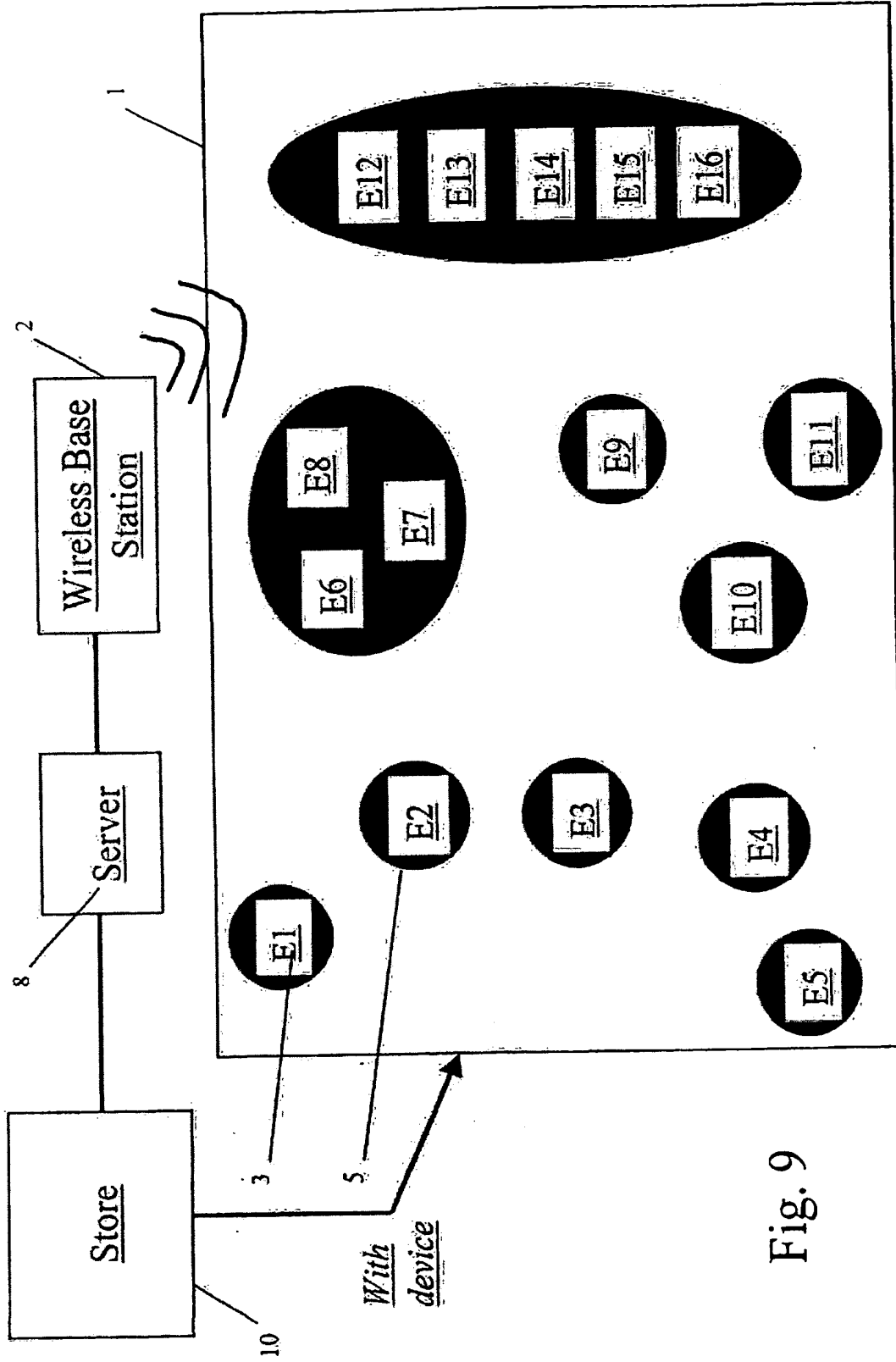


Fig. 9

A TECHNIQUE FOR DISTRIBUTING INFORMATION
WITHIN A WIRELESS NETWORK

Field of the Invention

5 The present invention relates to a technique for distributing information within a wireless network.

Description of the Prior Art

 It is often desirable to distribute information to people, the content of the information being dependent on an individual's location. For example, when in shops
10 such as supermarkets or other large retail outlets, posters or other forms of presentation may be used to convey information to a person concerning particular special offers for products that that person is in the vicinity of. Considering another example, when in a museum or exhibition centre, a person may be provided with a leaflet providing information about items to be found at particular locations within the museum or
15 exhibition. Alternatively, the person may be able to hire some headphones from the museum or exhibition, with details of particular items being provided via the headphones as that person passes through the museum or exhibition.

 A yet further example occurs in town centres or shopping malls, where in an attempt to attract people into individual shops, retailers use various advertising
20 techniques such as the use of banners, or the distribution of leaflets by staff, to entice people off the streets into their shops.

 Whilst any of the above mentioned techniques may prove effective in particular situations, it is desirable to provide a more generic technique for distributing information to individuals based on location.

25 Summary of the Invention

 According to a first aspect, the present invention provides a system for distributing within a wireless network information concerning items of interest positioned within a coverage area of the wireless network, comprising: a base station for communicating with a portable device over the wireless network via a first
30 wireless communication; a beacon positioned in the vicinity of each item of interest and arranged to transmit via a second wireless communication over a predetermined

range a code identifying information associated with that item; a portable device having a first interface for communicating with the base station and a second interface for communicating with the beacon; the portable device being arranged when within the predetermined range of a beacon associated with one of the items of interest to
5 receive the code transmitted by that beacon and to issue to the base station a request for information based on the received code; the base station being arranged to cause the information identified by the code to be retrieved, and to transmit that information to the portable device.

The development of wireless technologies is now at a stage where the network
10 capacity allows data to be transferred at high speeds. Examples of wireless technologies which would support such data transfer are "Home RF", a derivative of Digital Enhanced Cordless Technology (DECT), Bluetooth, UMTS, or Wireless LAN. These technologies allow high speed data transfer, for example UMTS would allow high bandwidth data transfer up to 2 Mbits/sec, whilst Wireless LAN would
15 allow data transfer up to 11 Mbits/sec. Details of the HomeRF Shared Wireless Access Protocol (SWAP) can be obtained from the web page www.homerf.org. UMTS is the name given to the Third Generation Mobile Communication Standard covered by ETSI and ITU standards. Bluetooth is an adhoc scatternet for affordable and highly functional wireless connectivity, and specifications of it can be obtained
20 from the web page www.bluetooth.com. Wireless LAN is defined by IEEE standards, IEEE 802.11 and IEEE 802.11a, the latter being for high speed 11Mbits/sec interconnectivity.

Accordingly, it would be possible to distribute a large amount of information to individuals assuming those individuals had suitable portable devices for receiving
25 that information over such a wireless network. Having realised the potential for such emerging wireless technologies to disseminate information, a further problem to be solved is how to distribute information that is specific to a particular user's location.

In accordance with the present invention this problem is solved by the use of two separate wireless communications. Firstly, a wireless network is provided with
30 which the portable device can communicate via a first wireless communication, this wireless network being "pervasive", in that all of the items of interest on which the

portable device can receive information are located within the coverage area of the wireless network. The wireless network coverage area may be composed of a number of base stations, each serving a portion of the coverage area.

Further, a beacon is positioned in the vicinity of each item of interest and is
5 arranged to transmit via a second wireless communication over a predetermined range a code identifying information associated with that item.

The portable device is provided with a first interface for communicating with the base station and a second interface for communicating with the beacons. By this approach, when the portable device is within the predetermined range of a beacon
10 associated with a particular item of interest, it can be arranged to receive the code transmitted by the associated beacon, and based on that code the portable device can then issue to the base station a request for the information. The base station is configured such that it is able to cause the information identified by the code to be retrieved, and is then able to transmit that information to the portable device over the
15 wireless network. In preferred embodiments, this is done by routing the request from the base station to a server, where the information is retrieved. The wireless network preferably would support high speed data transfer to the portable device, and so, for example, could be one of the earlier mentioned wireless technologies.

By this approach, it can be seen that the emerging wireless technologies that
20 support high speed data transfer can be used to deliver information to a portable device based on its location, since the actual information transmitted is dependent on a signal transmitted by the portable itself based on a code received from a nearby beacon associated with an item of interest.

It will be appreciated that the items of interest may be anything upon which it
25 is desirable to distribute information, and so could be buildings, objects, landmarks, etc.

It will be appreciated that the code transmitted by the beacon could take a variety of forms, and that at some point the code may need to be decoded in order to specifically identify a required block of information. This decoding could take place
30 within the portable device itself prior to issuance of the request to the base station, or alternatively the code could be passed on unaltered within the request to the base

station, with the decoding then being initiated via the base station, for example by routing of the request to a server, where the code is then decoded. The decoding might simply involve the use of a look-up table, or alternatively may involve more complex decoding techniques.

- 5 However, in preferred embodiments, the code is an address for a block of information accessible by the base station via a server, and the request issued by the portable device to the base station provides the address. The server may be connected to databases containing the required information via any number of wired or wireless networks. In one embodiment, the databases may be provided on an Intranet.
- 10 However, in preferred embodiments, the address is a URL address for an Internet web page, the portable device is arranged to support a web browser, and the base station is arranged to transmit data to the portable device to enable the web page to be displayed via the web browser.

 Preferably, the beacons are arranged to use a short range wireless technology
15 to transmit the codes via the second wireless communication. In preferred embodiments, the second wireless communication takes place via an infrared signal. However, alternatively wireless technologies such as Bluetooth may be used for the second wireless communication.

 Viewed from a second aspect, the present invention provides a portable device
20 for receiving via a wireless network information concerning items of interest positioned within a coverage area of the wireless network, comprising: a controller for controlling the operation of the portable device; an output mechanism for outputting information to a user of the portable device; a first interface for communicating with a base station over the wireless network via a first wireless
25 communication; a second interface for communicating with beacons, a beacon being positioned in the vicinity of each item of interest and being arranged to transmit via a second wireless communication over a predetermined range a code identifying information associated with that item; the portable device being arranged when within the predetermined range of a beacon associated with one of the items of interest to
30 receive via the second interface the code transmitted by that beacon, the controller being arranged to cause a request for information based on the received code to be

issued via the first interface to the base station; the controller further being arranged, upon receipt of the requested information from the base station via the first interface, to cause the information to be output to the user via the output mechanism.

Hence, in accordance with the second aspect of the invention, the portable
5 device communicates with the base station over the wireless network via a first interface and communicates with beacons via a second interface. When the portable device is within the predetermined range of a beacon associated with an item of interest, it is arranged to receive the code from the associated beacon, and based on that to generate a request for information which is transmitted onto the base station.
10 When the required information is returned from the base station, the portable device is arranged to output that information to the user via the output mechanism of the portable device.

In preferred embodiments, the output mechanism comprises a display device to enable the information to be visually displayed to the user. Having regard to this
15 embodiment, the address is preferably a URL address for an Internet web page, the portable device being arranged to support a web browser, whereby the controller is arranged upon receipt of the requested information from the base station via the first interface, to cause the web page to be displayed on the display device via the web browser.

20 In preferred embodiments, the second interface of the portable device comprises an infrared detector for detecting infrared signals transmitted by the beacon.

In one embodiment, the beacons may be arranged to continually transmit their associated codes, or to transmit their associated codes at periodic intervals, such that
25 once the portable device is within the predetermined range of a beacon associated with an object of interest, it will receive the code from the associated beacon. However, in an alternative embodiment, the portable device further comprises an input mechanism for enabling the user to interact with the portable device, wherein when the portable device is in the vicinity of one of the items of interest, the user can
30 indicate to the controller via the input mechanism that information is desired, whereby the controller is arranged to cause the second interface to output a signal to the beacon

to cause the beacon to transmit the code. In this embodiment, the beacon is arranged to transmit the code when it receives an appropriate signal from the portable device.

Viewed from a third aspect, the present invention provides a method of distributing to a portable device within a wireless network information concerning
5 items of interest positioned within a coverage area of the wireless network, a base station being provided for communicating with the portable device over the wireless network via a first wireless communication, and a beacon being positioned in the vicinity of each item of interest for transmitting via a second wireless communication over a predetermined range a code identifying information associated with that item.
10 the method comprising the steps of: (i) when the portable device is within the predetermined range of a beacon associated with one of the items of interest, transmitting from that beacon the code identifying information associated with that item; (ii) issuing from the portable device to the base station a request for information based on the received code; (iii) upon receipt of the request at the base station,
15 retrieving the information identified by the code; and (iv) transmitting that information from the base station to the portable device to enable that information to be provided to a user of the portable device.

Viewed from a fourth aspect the present invention provides a method of operating a portable device to receive via a wireless network information concerning
20 items of interest positioned within a coverage area of the wireless network, the portable device having a first interface for communicating with a base station over the wireless network via a first wireless communication, and a second interface for communicating with beacons, a beacon being positioned in the vicinity of each item of interest for transmitting via a second wireless communication over a predetermined
25 range a code identifying information associated with that item, the method comprising: (i) receiving via the second interface, when within the predetermined range of a beacon associated with one of the items of interest, the code transmitted by that beacon; (ii) issuing via the first interface to the base station a request for information based on the received code; and (iii) upon receipt of the requested
30 information from the base station via the first interface, causing the information to be output to the user.

Viewed from a fifth aspect, the present invention provides a computer program or computer program product for operating a portable device to receive via a wireless network information concerning items of interest positioned within a coverage area of the wireless network, the portable device having an output
5 mechanism for outputting information to a user of the portable device, the computer program comprising: a first interface element configured in operation to communicate with a base station over the wireless network via a first wireless communication; a second interface element configured in operation to communicate with beacons, a beacon being positioned in the vicinity of each item of interest and being arranged to
10 transmit via a second wireless communication over a predetermined range a code identifying information associated with that item, and the second interface element being arranged when the portable device is within the predetermined range of a beacon associated with one of the items of interest to receive the code transmitted by that beacon; and a request mechanism configured in operation to cause a request for
15 information based on the received code to be issued via the first interface element to the base station; whereby upon receipt of the requested information from the base station via the first interface element, the information is arranged to be output to the user via the output mechanism.

Viewed from a sixth aspect, the present invention provides a beacon for use in
20 a system for distributing within a wireless network information concerning items of interest positioned within a coverage area of the wireless network, the system having a base station for communicating with a portable device over the wireless network via a first wireless communication, and a portable device having a first interface for communicating with the base station and a second interface for communicating with
25 the beacon, the beacon comprising: a transmitter arranged to transmit via a second wireless communication over a predetermined range a code identifying information associated with an item of interest with which the beacon is associated; whereby the portable device when within the predetermined range of the beacon is arranged to receive the code transmitted by that beacon and to issue to the base station a request
30 for information based on the received code, the base station being arranged to cause

the information identified by the code to be retrieved, and to transmit that information to the portable device.

Brief Description of the Drawings

The present invention will be described further, by way of example only, with
5 reference to preferred embodiments thereof as illustrated in the accompanying drawings, in which:

Figure 1 is a schematic illustration of a system in accordance with a first embodiment of the present invention;

Figure 2 is a diagram illustrating how information is retrieved in accordance with
10 a preferred embodiment of the present invention;

Figure 3 is a block diagram of a portable device in accordance with a preferred embodiment of the present invention;

Figure 4 is a block diagram of a beacon in accordance with a preferred embodiment of the present invention;

15 *Figures 5 and 6 illustrate the process performed within the portable device to enable information to be retrieved in accordance with a preferred embodiment of the present invention;*

Figure 7 is a flow diagram illustrating the operation of a beacon in accordance with one embodiment of the present invention;

20 Figure 8 is a flow diagram illustrating the operation of a beacon in accordance with an alternative embodiment of the present invention; and

Figure 9 is a schematic illustration of a system in accordance with a second embodiment of the present invention.

Description of Preferred Embodiments

25 Figure 1 is a schematic illustration of system in accordance with a first embodiment of the present invention. In accordance with this embodiment, a number of items of interest are positioned within a coverage area of a wireless pervasive network 1 such as Bluetooth, UMTS or Wireless LAN. The wireless network 1 allows data to be transferred at high speeds, e.g. in the region of 2 Mbits per second for UMTS, or 11
30 Mbits/sec for Wireless LAN.

In preferred embodiments of the present invention, a user of the system will be provided with a portable device 6 having the ability to support this high bandwidth of network 1, and being arranged to communicate via the wireless network 1 with a wireless base station 2. Associated with each item of interest are one or more wireless beacons 4. 5 in preferred embodiments these beacons using infrared signals, e.g. infrared ASK (Amplitude Shift Keying) signals. Alternatively, IrDA (Infra red Data Association) signals might be used. By use of an appropriate lens facility, these beacons can be arranged to output a wireless data signal over a range of 2 to 3 meters around the beacon. Hence, as illustrated in figure 1, a pickup range 5 is associated with each beacon 4. or set 10 of beacons, and when the portable device 6 is within the pickup range 5 for a particular beacon 4, then the portable device 6 can be arranged to receive data from that beacon.

More particularly, when the portable device 6 is within a pickup range 5 for a particular beacon 4, a link can be established between the beacon and the portable device in order to determine what information should be sent to the device which is relevant to 15 the position of the user within the pervasive network 1. The mechanism used in preferred embodiments for the communication between the beacon 4 and the portable device 6 will be described in more detail later. However, in summary, the portable device 6 will receive a code from the beacon identifying information relevant to the item of interest with which that beacon is associated. The portable device is then arranged to 20 issue to the base station 2 a request for information based on the received code. The portable device 6 may decode the code into some other form prior to transmission to the wireless base station 2, or may just transmit the code "as is" to the wireless base station 2.

The wireless base station 2 is then arranged to cause the information identified by the code to be retrieved. The code may be such that some decoding of the code needs to 25 be performed in order to generate an identifier that can be used to directly retrieve the information, or alternatively the code may directly provide the identifier required to retrieve the information. In preferred embodiments, the code is an address for a block of information, and can be used directly without the requirement for any decoding.

In preferred embodiments, the information is accessible by the base station via a 30 server 8, which is then networked to Internet or Intranet 7 upon which the information resides.

Once the information has been retrieved from the Internet or Intranet 7 via the server 8, the wireless base station 2 is arranged to transmit that information over the pervasive network 1 to the portable device 6. The portable device 6 is then arranged to output that information to the user via an appropriate interface. In preferred
 5 embodiments, the portable device includes a display area, and the information is displayed visually to the user. Given the current proliferation of the World Wide Web (WWW), the information associated with the items of interest are preferably provided by web pages on the Internet, and the portable device 6 is arranged to support a web browser, such that web pages can be displayed to the user, these web pages being down-
 10 loaded via the wireless base station 2 based on the codes received by the portable device 6 from individual beacons 4.

In the system illustrated in figure 1, the pervasive network 1 may cover a large building such as a supermarket or shopping centre, with the items of interest being particular shopping aisles or goods within the supermarket, or particular shops, etc.
 15 within the shopping centre. Hence, considering the supermarket example, as the user moves around the supermarket, the user can be provided via the portable device 6 with up-to-date information about special offers for particular goods or any other marketing information which the supermarket owner may wish to disseminate. Similarly, within the shopping centre environment, as the user moves through the shopping centre, the
 20 portable device 6 may be arranged to automatically pick up advertising information for particular shops which the user is in the vicinity of.

An alternative embodiment of the system is illustrated in figure 9, where in this case the building is a museum, and the items of interest are exhibits within the museum. Firstly, a user will go to a store 10, which acts as a collection point for portable devices.
 25 The devices are activated for a particular user, and as the user then walks into the gallery, he/she is faced with a number of exhibits 3. Each exhibit or exhibit area is fitted with an infra red beacon, which transmits data over a pickup range 5 around each exhibit 3. In a similar fashion to that described earlier with reference to figure 1, a link is established between a beacon and a portable device within the pickup range of that beacon in order
 30 to determine the position/area of the user. The portable device then receives a code from the beacon, and transmits that code as a request for information to the wireless base

station 2 via the pervasive network 1. The information is then retrieved via the server 8, and then transmitted back to the portable device over the pervasive network, to allow the data to be displayed to the user. In preferred embodiments, each portable device displays information in the form of a web browser, with the web page information being
 5 transmitted over the high capacity pervasive network 1.

By this approach, it will be appreciated that the information on the portable device can automatically be updated as the user moves between the various exhibits in the museum, since as the user moves to a new exhibit, it will receive a new code which can then be used to download a new web page.

10 Hence, it will be appreciated that the above system makes use of a simple web authored database of information, which can be accessed based on codes received by the portable device from particular beacons. An allocated web site that exists on the Internet or Intranet may be accessed and updated from the main server 8, and in preferred embodiments a web site is responsible for delivering information as users move between
 15 different infra red beacons.

It will be appreciated that the portable devices of either the Figure 1 or Figure 9 embodiment may take a variety of forms. In preferred embodiments, each device has a LCD on which information regarding the item of interest is displayed in the form of a web browsing interface. The user can scroll through information and move forward and
 20 backward to links to find out more information. Further, in preferred embodiments, the device has the ability to save key information that the user wishes to keep. It would then be possible for the user to subsequently print the information, download the information as a data file, or e-mail the information to a desired e-mail address.

As an additional feature, some initial beacons that the user passes on entering the
 25 museum could be used to calibrate the device and ask questions of the user. For instance, the user may be asked to specify which language to be adopted. Other options such as the age group of the user can also be determined, and this information can be used to ensure that the codes provided from the beacons relate to information that is tailored for particular age groups. Hence, for example, 6 to 11 year olds could be provided with
 30 information more suitable to their learning and age range, whilst adults could be presented with more detailed information. Having gathered this information for a

particular portable device, the infrared beacon 4 can be arranged to transmit a code appropriate for the particular portable device.

In the embodiment illustrated in figure 9, the store 10 can be used as a central management point. The store would preferably take the form of a kiosk or information desk. On individual or party (for example a school visit) arrival, portable devices in the form of a hand held device could be hired, for example for a small fee. Each device would preferably contain a security tagging system so that the device could not be removed from the premises. In preferred embodiments, each device is fitted with a save mechanism which allows links, images, etc. either to be saved on the device, or to a nominated server via the wireless communication link 1. Once the device is returned to the store 10, the links can then be downloaded to a printer for hard copy information, or sent via e-mail to the address of the users choice from the store. If desired, a fee could be charged depending on the size of information saved, sent or printed.

The mechanism used in preferred embodiments for communication between the beacon 4 and the portable device 6 will now be described in more detail with reference to figure 2. In the embodiment illustrated in Figure 2, the beacon 4 can be arranged to communicate with the portable device 6 via infrared. The infrared beacon 4 may be arranged to transmit a code continuously, or to transmit the code at periodic intervals, for pickup by any portable device 6 within the infrared pickup range of the beacon. In preferred embodiments, the beacon 4 transmits a pre-programmed code, preferably a web address, to the device 6, via infrared. The web address received in the form of a URL link is then preferably updated to the web browser that resides in the portable device 6. Then, the web browser causes the portable device to issue a request over the network 1 for that particular web page, assuming that the web address relates to a web page not stored locally on the portable device. This information is loaded from the Internet/Intranet 7 by the server 8, and then retransmitted via the wireless base station 2 to the portable device 6, for display on the web browser interface.

In an alternative embodiment, the portable device 6 may be arranged to contact the beacon 4 first, prior to any signal being issued by the beacon. This may take the form of a periodic signal sent automatically by the portable device 6, or alternatively the transmission of the infrared signal may be activated directly by the user of the portable

device. Based on the signal received from the portable device, the beacon 4 then transfers a pre-programmed code, preferably a web address, to the device 6, via infrared. and the process then proceeds as described above. The use of a specific request signal from the portable device 6 enables some tailoring of the code returned from the infrared
5 beacon 4 to take account of individual users. For example, some default beacons could be used to obtain information about the user (age group, language to be used, etc). Having gathered this information for a particular portable device, the infrared beacon 4 can be arranged to transmit a code appropriate for the particular portable device.

Figure 3 is a block diagram illustrating the main components of the portable
10 device 60 of preferred embodiments of the present invention. Portable device 60 contains a microprocessor 100 for performing the key processing operations of the portable device. Power supply 105, such as a rechargeable battery, is used to provide the power required by the microprocessor 100 to operate the portable device. A touch screen 210 is provided to enable a user to interact with the portable device, so as to enable
15 responses to particular questions to be made, and to enable the user to browse through the web information provided. Further, a speaker 120 and/or an audio output port 130 to enable external headphones to be fitted, are provided, such that audio signals generated by a CODEC 110 can be output to the user.

The portable device 60 has two interfaces, the first being in preferred
20 embodiments a Wireless LAN interface 140 to enable the portable device to communicate via the pervasive network 1 with the wireless base station 2. Further, in preferred embodiments, the second interface is an infrared interface 150 to enable the portable device to communicate with the beacons 40.

In preferred embodiments, the web pages are displayed on a LCD display 170,
25 the touch screen 210 being located on the LCD display. Further, a serial port 160 is preferably provided to enable information stored on the portable device to be downloaded at a suitable point.

As illustrated in Figure 3, the portable device 6 is also arranged to support a web
30 browser 220 to facilitate the retrieval of web pages based on URL addresses obtained from beacons.

In addition, the portable device 60 contains various memories for storing both the code executed on the microprocessor 100 and the information retrieved, including particular items of information saved by the user. In preferred embodiments, these memories take the form of flash subsystem 180, an EPROM 190 and DRAM 200.

- 5 Typically, the default boot code is located in the EPROM 190, the flash subsystem 180 is configured with a file management system and provides caching for the web browser, and the DRAM 200 is used for executing the applications.

Figure 4 is a block diagram illustrating the core components of the beacon 4. The beacon has a microprocessor 300 for performing the main processing within the beacon.
 10 A power supply 310 is used to provide the power to the microprocessor, and may take the form of a mains powered supply, or a rechargeable battery. An infrared interface 320 is provided to enable signals to be received from the portable device 6 (if necessary) and for signals to be transmitted to the portable device 6. A serial interface 330 is provided to enable information to be loaded into the beacon (e.g. new URL details), and/or
 15 downloaded from the beacon.

A random access memory (RAM) 340 is provided from which applications can execute under the control of the microprocessor 300. The RAM may also be used to store codes to be transmitted by the beacon. Further, an EPROM 360 stores default code, and an E2PROM 350 is used to store slow changing information such as security IDs,
 20 etc, or copies of the codes to be transmitted by the beacon.

Figure 5 is a flow diagram illustrating the basic operation of the portable device when arranged to retrieve information in accordance with the preferred embodiment of the present invention. The process starts at step 400, and then at step 410 the system is initialised. At this point, the wireless interface would be initialised, transmit and receive
 25 buffers would be created, etc. At step 420, a periodic timer is then started which automatically resets itself when it times out, and at step 430 it is determined whether that timer has timed out. Accordingly, a timer may be set such that it times out after a desired interval, for example every second. Accordingly, at step 430, once that time interval has elapsed, the timer will have timed out, and in that event the process proceeds to step 440,
 30 where an infrared receive buffer is read. With reference to Figure 3, the infrared receive buffer may be provided within the DRAM 200, and preferably takes the form of a First-

In-First-Out (FIFO) buffer. Signals received by the infrared port 150 from beacons are routed into the infrared receive buffer within the DRAM 200.

At step 450, the information retrieved from an entry in the infrared receive buffer is then parsed in order to determine a URL address within that information. Once the URL address has been read, it is determined at step 460 whether that URL address is new, and if not the process returns to step 430 to await the timing out of the periodic timer.

However, if the URL is new, and hence the information concerning that URL has not yet been retrieved, then the process proceeds to step 470, where the portable device is arranged to browse to that URL in order to retrieve new information. The process performed at step 470 is illustrated in more detail with reference to Figure 6.

As illustrated in Figure 6, the process starts at step 500, and proceeds to step 510, where the URL address retrieved from the infrared receive buffer 440 is made available to the browser provided within the portable device 6. Typically, this merely involves control software entering the URL address into the web browser as a new URL address to be retrieved.

At step 520, the web browser determines whether the URL made available at step 510 is referencing material already on the client device, and if it is, the appropriate web page is retrieved from local storage within the portable device and displayed to the user at step 550. The process then moves to step 560, where the process ends. However, assuming the URL address does not reference material already on the client device, then the web browser is caused to initiate a request for the web page specified by that URL. As discussed earlier, this involves the portable device issuing a request over the wireless network 1 via the interface 140. This request is received by the wireless base station 2, and routed to the server 8 which is then responsible for retrieving the information. Once the information has been retrieved, that information is passed back to the wireless base station 2 for transmission to the portable device 6.

Once the response is received by the portable device from the wireless base station 2, the portable device is then arranged to act accordingly (step 540). Hence, for example, assuming a valid web page is retrieved, then the web browser will be used to display that web page to the user. Alternatively, if an error message is received, for

example because the URL is invalid, then the portable device is arranged to display that error message to the user. The process then proceeds to step 560, where the process terminates. Once step 560 is reached, that completes the processing at step 470 in Figure 5, and accordingly the process then returns to step 430 to await the timing out of the
 5 periodic timer.

One embodiment of the beacon that may be used will now be described further with reference to Figure 7. As described in Figure 7, the beacon is started at step 600. and proceeds to step 610, where the beacon is initialised. At this stage, operating code will be loaded into RAM, the infrared interface parameters will be set, transmit buffers
 10 will be created, etc. Then, at step 620, a timer is set running, and at step 630 it is determined whether that timer has timed out. If not, the process remains at step 630 until the timer has timed out. at which point the process proceeds to step 640, where a predetermined URL is transmitted via the infrared interface 320 of the beacon 4. The timer is then reinitialised at step 650, and the process returns to step 620 where the timer
 15 is again set running. By this approach, the beacon is arranged to periodically transmit the code, for example twice every second, such that any portable device moving into the pickup range of the beacon will automatically receive the code.

In an alternative embodiment, the beacon can be arranged such that it only transmits the URL upon receiving a specific request. Hence, with reference to Figure 8.
 20 the beacon is started, and the first step (step 710) is to initialise the beacon. Then, at step 720, it is determined whether a request has been received by the beacon to send an *infrared signal containing the URL*. *This request may be received from the portable device 6 under appropriate control of the user, for example by the user entering a command into the portable device to cause the device to send a request signal to the*
 25 *beacon. However, alternatively, if the location of the beacon is appropriate, a nearby activation device (e.g., a push button, a switch or the like) associated with the beacon may be used, such that when a user activates the activation device, the beacon is arranged to transmit its code.*

If no request is received, the process loops back to step 720, until such time as a
 30 request is received. Then, once a request is received, the process proceeds to step 730.

where a predetermined URL is transmitted via the infrared interface 320. The process then returns to step 720 to await a subsequent request.

Although a particular embodiment of the invention has been described herewith, it will be apparent that the invention is not limited thereto, and that many modifications
5 and additions may be made within the scope of the invention. For example, various combinations of the features of the following dependent claims could be made with the features of the independent claims without departing from the scope of the present invention.

CLAIMS

1. A system for distributing within a wireless network information concerning items of interest positioned within a coverage area of the wireless network.
5 comprising:
 - a base station for communicating with a portable device over the wireless network via a first wireless communication;
 - a beacon positioned in the vicinity of each item of interest and arranged to transmit via a second wireless communication over a predetermined range a code
10 identifying information associated with that item;
 - a portable device having a first interface for communicating with the base station and a second interface for communicating with the beacon;
 - the portable device being arranged when within the predetermined range of a beacon associated with one of the items of interest to receive the code transmitted by
15 that beacon and to issue to the base station a request for information based on the received code;
 - the base station being arranged to cause the information identified by the code to be retrieved, and to transmit that information to the portable device.
- 20 2. A system as claimed in Claim 1, wherein the code is an address for a block of information accessible by the base station via a server, and the request issued by the portable device to the base station provides the address.
3. A system as claimed in Claim 2, wherein the address is a URL address for an
25 Internet web page, the portable device is arranged to support a web browser, and the base station is arranged to transmit data to the portable device to enable the web page to be displayed via the web browser.
4. A system as claimed in any of claims 1 to 3, wherein the second wireless
30 communication takes place via an infrared signal.

5. A portable device for receiving via a wireless network information concerning items of interest positioned within a coverage area of the wireless network, comprising:

a controller for controlling the operation of the portable device;

5 an output mechanism for outputting information to a user of the portable device:

a first interface for communicating with a base station over the wireless network via a first wireless communication;

a second interface for communicating with beacons, a beacon being positioned
10 in the vicinity of each item of interest and being arranged to transmit via a second wireless communication over a predetermined range a code identifying information associated with that item;

the portable device being arranged when within the predetermined range of a beacon associated with one of the items of interest to receive via the second interface
15 the code transmitted by that beacon, the controller being arranged to cause a request for information based on the received code to be issued via the first interface to the base station;

the controller further being arranged, upon receipt of the requested information from the base station via the first interface, to cause the information to be
20 output to the user via the output mechanism.

6. A portable device as claimed in Claim 5, wherein the code is an address for a block of information accessible by the base station via a server, and the request issued by the portable device to the base station via the first interface provides the address.

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7. A portable device as claimed in Claim 5 or Claim 6, wherein the output mechanism comprises a display device to enable the information to be visually displayed to the user.

30 8. A portable device as claimed in Claim 6 and Claim 7, wherein the address is a URL address for an Internet web page, the portable device being arranged to support a

web browser, whereby the controller is arranged upon receipt of the requested information from the base station via the first interface, to cause the web page to be displayed on the display device via the web browser.

5 9. A portable device as claimed in any of claims 5 to 8, wherein the second interface comprises an infrared detector for detecting infrared signals transmitted by the beacon.

10 10. A portable device as claimed in any of claims 5 to 9, further comprising an input mechanism for enabling the user to interact with the portable device, wherein when the portable device is in the vicinity of one of the items of interest, the user can indicate to the controller via the input mechanism that information is desired, whereby the controller is arranged to cause the second interface to output a signal to the beacon to cause the beacon to transmit the code.

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11. A method of distributing to a portable device within a wireless network information concerning items of interest positioned within a coverage area of the wireless network, a base station being provided for communicating with the portable device over the wireless network via a first wireless communication, and a beacon
20 being positioned in the vicinity of each item of interest for transmitting via a second wireless communication over a predetermined range a code identifying information associated with that item, the method comprising the steps of:

(i) when the portable device is within the predetermined range of a beacon associated with one of the items of interest, transmitting from that beacon the code
25 identifying information associated with that item;

(ii) issuing from the portable device to the base station a request for information based on the received code;

(iii) upon receipt of the request at the base station, retrieving the information identified by the code; and

30 (iv) transmitting that information from the base station to the portable device to enable that information to be provided to a user of the portable device.

12. A method of operating a portable device to receive via a wireless network information concerning items of interest positioned within a coverage area of the wireless network, the portable device having a first interface for communicating with
 5 a base station over the wireless network via a first wireless communication, and a second interface for communicating with beacons, a beacon being positioned in the vicinity of each item of interest for transmitting via a second wireless communication over a predetermined range a code identifying information associated with that item, the method comprising:
- 10 (i) receiving via the second interface, when within the predetermined range of a beacon associated with one of the items of interest, the code transmitted by that beacon;
- (ii) issuing via the first interface to the base station a request for information based on the received code; and
- 15 (iii) upon receipt of the requested information from the base station via the first interface, causing the information to be output to the user.

13. A computer program for operating a portable device to receive via a wireless network information concerning items of interest positioned within a coverage area of
 20 the wireless network, the portable device having an output mechanism for outputting information to a user of the portable device, the computer program comprising:
- a first interface element configured in operation to communicate with a base station over the wireless network via a first wireless communication;
- a second interface element configured in operation to communicate with
 25 beacons, a beacon being positioned in the vicinity of each item of interest and being arranged to transmit via a second wireless communication over a predetermined range a code identifying information associated with that item, and the second interface element being arranged when the portable device is within the predetermined range of a beacon associated with one of the items of interest to receive the code transmitted
 30 by that beacon; and

a request mechanism configured in operation to cause a request for information based on the received code to be issued via the first interface element to the base station;

whereby upon receipt of the requested information from the base station via the first interface element, the information is arranged to be output to the user via the output mechanism.

14. A beacon for use in a system for distributing within a wireless network information concerning items of interest positioned within a coverage area of the wireless network, the system having a base station for communicating with a portable device over the wireless network via a first wireless communication, and a portable device having a first interface for communicating with the base station and a second interface for communicating with the beacon, the beacon comprising:

a transmitter arranged to transmit via a second wireless communication over a predetermined range a code identifying information associated with an item of interest with which the beacon is associated;

whereby the portable device when within the predetermined range of the beacon is arranged to receive the code transmitted by that beacon and to issue to the base station a request for information based on the received code, the base station being arranged to cause the information identified by the code to be retrieved, and to transmit that information to the portable device.

15. A system for distributing within a wireless network information concerning items of interest positioned within a coverage area of the wireless network, substantially as hereinbefore described with reference to the accompanying drawings.

16. A portable device for receiving via a wireless network information concerning items of interest positioned within a coverage area of the wireless network, substantially as hereinbefore described with reference to the accompanying drawings.

17. A method of distributing to a portable device within a wireless network information concerning items of interest positioned within a coverage area of the wireless network, substantially as hereinbefore described with reference to the accompanying drawings.

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18. A method of operating a portable device to receive via a wireless network information concerning items of interest positioned within a coverage area of the wireless network, substantially as hereinbefore described with reference to the accompanying drawings.

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19. A computer program for operating a portable device to receive via a wireless network information concerning items of interest positioned within a coverage area of the wireless network, substantially as hereinbefore described with reference to the accompanying drawings.

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20. A beacon for use in a system for distributing within a wireless network information concerning items of interest positioned within a coverage area of the wireless network, substantially as hereinbefore described with reference to the accompanying drawings.

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Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.R): H4L: LDA, LDGX, LDLX; G4Q: QAJ

Int Cl (Ed.7): G08G, H04Q

Other: Online: WPI, JAPIO, EPODOC

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	GB2327565 A IBM - see especially figures 1, 4, 6 and lines 27-30 on page 5, lines 19- 41 on page 6, lines 12-16, 34-41 on page 7, lines 1-5, 10, 11 and lines 32-38 on page 8 and lines 8-11 on page 9	1-14
X	GB2327564 A IBM - see especially figures 1, 3, 4, 6 and lines 30-41 on page 6 and lines 1-4, 36-41 on page 7 and lines 1-21 on page 8	1-3, 5-8, 10-14
X	WO 94/11967 A1 WEEKS et al - see especially figure 1 and lines 21-28 on page 9, lines 13-25 on page 16 and lines 5-7 on page 20.	1, 5, 11, 12 and 14

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.